apparatus; an electromotor room, with eight types of motors for continuous current and, for single, two- and three-phase alternating currents, including a 500-volt 25-B.H.P. tramway motor; a dynamo room with eight pairs of motor-driven generators and rotaries, each having its own switch-panel, and developing from 4 h.p. to 30 h.p. at almost any pressure and periodicity. These sixteen machines are nearly all of the latest types, and comprise series, shunt and compound wound generators, single-phase, two-phase, and three-phase alternators, a double commutator, continuous current rotary, and a polyphase rotary converter; and, finally, an electrical engineering laboratory with all the necessary apparatus for instruction in the principles and practice of the subject.

Physics Department.—Prior to 1884, when the present lecture-room and laboratory were erected, the number of students taking practical work was extremely small, and the accommodation provided was regarded at that time as ample. From 1884 to 1898 the number of laboratory students increased eight-fold, and accommodation for them could only be found by annexing and utilising various cellars and underground corridors. In 1898 the Department had about 100 students, and comprised 220 square yards on two different floors, serving for all but electrical work, and 300 square yards of cellars, in which electrical experiments had to be carried on. Subsequently, a dark room of 150 square yards in the form of a corrugated iron building was added for advanced optical work, and another cellar of 200 square yards for elementary physics. The new premises, which consist of a one-storey shed covering the former tennis courts, will add about 1600 square yards, and will be divided into sections for elementary and advanced work. It is anticipated that the space will not only accommodate the present number of students, but will allow of an increase up to 50 per cent. It is impossible, however, that the present structure should have a very long life. Glass-roofed sheds and thin brick walls do not furnish ideal conditions for a physical laboratory, and it is anticipated that as soon as funds allow, a building having some relation to the importance of the subject and the large number of students in attendance will be erected.

Organic Chemistry Department.—The history of this department begins with the foundation of a lectureship and its recognition as a separate department in 1891. There was then no special provision for the study of practical organic chemistry. The department was first housed in a private laboratory and furnace-room on the ground floor; but as the number of students increased, additional accommodation had to be found, and a portion of the large lecture theatre was partitioned off, providing bench room for twenty-two students. The new temporary one-storey building, which adjoins the new physical laboratory, will double the present bench space, as well as provide a private laboratory for the professor and a temporary laboratory for occasional classes. As in the case of the Physics Department, it is only lack of funds which prevents suitable provision being made for this branch of practical chemistry.

Civil and Mechanical Engineering Department.—This department was founded in 1876, and for eight years was carried on under some difficulties as to space and equipment. In 1884 a special fund was raised by the engineers of the district for the building of a new department, with laboratories, drawing-office, lecture-rooms, &c. The accommodation proved sufficient for some years, but as the number of students increased, it was found necessary to absorb into the department other small rooms of the college, and in 1891 the authorities found themselves compelled to limit the number of students to eighty. The new block is an extension of the 1884 buildings on the north side, and contains a laboratory specially fitted up for hydraulics and one for applied mechanics, as well as an extension of the drawing-office.

This brief history of the university and the account of its new buildings is a record of small beginnings and steady growth. Each department has passed through a similar series of phases, a more or less rapid rise in numbers causing increasing pressure from within, which has led to expansion by various temporary expedients until the department has had to detach itself from the parent building and set up house for itself. There may be now an interval of apparent repose; but there is little doubt that the process will repeat itself. Temporary buildings will have to give place to permanent structures, properly adapted for the purpose which they have to serve, and physics and chemistry, the largest of the departments, will soon have to receive their share of attention. It will only be by constant appeals to the generosity of the public that the university will be able to fulfil the requirements which high teaching efficiency and modern equipment demand, if it is adequately to serve the interests of the city and county in which it is placed.

We have only referred to the work and appliances for ordinary teaching. The pursuit of research is eagerly encouraged, but here again the small sum at the disposal of the council for post-graduate fellowships and maintenance grants greatly reduces that form of assistance which heads of departments naturally look to in carrying out original investigations.

This form of assistance the Treasury has, unfortunately, not yet recommended in allocating funds for research, but its recognition cannot be urged too strongly or too frequently.

J. B. C.

A CAPE CATALOGUE OF STARS.[1]

THE most recent catalogue of stars emanating from the Cape Observatory contains the places of 1680 stars for the equinox 1900·0, deduced from observations made during the years 1905–6 under the direction of Sir D. Gill. The introduction, which is signed by Mr. S. S. Hough, explains that the stars observed with the old non-reversible transit circle in the above-mentioned years, the places of which are included in this catalogue, are chiefly stars south of declination −36° required by Prof. Boss in connection with the formation of his fundamental catalogue. The catalogue also includes stars the places of which are required in connection with the geodetic survey of South Africa, and stars of which occultations by the moon have been observed.

With regard to the right ascensions, it may be noted that the places of stars employed for the determination of clock-error were those of Newcomb's Fundamental Catalogue. It is also to be noted that the correction has been applied for the observers' personality depending on magnitude. The existence of this kind of personality was first detected by Sir D. Gill in his discussion of the places of the comparison stars used in connection with his determination of the solar parallax by observations of Mars in 1877. It is fit and proper, therefore, that the Cape Observatory should be a pioneer in this direction of refinement, and should include this correction, as a matter of routine, in the ordinary reductions of meridian transits of stars.

The declinations have been reduced with refractions based on the Pulkowa tables and adopted mean latitude of the transit circle, $-33^\circ\ 56'\ 3''{\cdot}50$. The observations have also been corrected for variation of latitude depending on the Chandler polar motion, in accordance with data supplied by Dr. Albrecht. Here again we note the anxious care of the authorities of the Cape Observatory to produce work of the highest excellence and refinement.

The catalogued places of the stars have been reduced by the application of precession alone (based on Newcomb's determination of the precessional constant) from the mean epoch of observation to 1900·0, but the necessary corrections for the inclusion of proper motions are given in a separate column. The adopted values of the latter elements have been taken from Newcomb, Boss, or Auwers.

In view of the uncertainty attaching to the proper motions of stars south of the zenith of the Cape, it is of interest to exhibit the corrections to the places of Prof. Boss's catalogue of 627 standard stars (*Astronomical Journal*, Nos. 531–2), derived from the comparison with the

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[1] "Catalogue of 1680 Stars for the Equinox 1900·0 from Observations made at the Royal Observatory, Cape of Good Hope, during the Years 1905–6." Under the direction of Sir David Gill, K.C.B., F.R.S., with Introduction by S. S. Hough, F.R.S. Pp. xii+44. (Edinburgh: Printed for H.M. Stationery Office by Neill and Co., Ltd., Bellevue, 1907.) Price 3*s*.

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places of the Cape catalogue before us, for the stars specified above, when arranged in zones of declination:—

South decl.	Δα.	Δδ	No. of stars
° °	s.	″	
34–46	−0·004	+0″·33	39
46–56	−0·008	+0·42	34
56–66	+0·009	+0·45	30
66–80	−0·049	+0·44	16

The discordances in right ascension for the first three zones are not larger than would be anticipated, bearing in mind the fact that Prof. Boss has not corrected his places for personality depending on magnitude. The mean correction for the polar zone is, however, quite uncertain, the mean (without regard to sign) of the individual discordances from the mean value entered above being as much as 0·102s., pointing to the extreme uncertainty with which right ascensions of even so-called "standard" stars situated in this portion of the sky are carried forward for a term of years.

There appears to be a well-marked systematic discordance of about 0″·4 in the declinations. This, however, is not the place in which to inquire into the origin of this discordance, which will doubtless receive due attention at the hands of Prof. Boss.

A melancholy interest attaches to the publication under review. Sir D. Gill, in a short preface, addresses a few words of farewell to the members of the staff of the Cape Observatory, referring to this catalogue as the last that will probably appear in connection with his name. The splendid work performed by Sir D. Gill at the Cape Observatory need not be emphasised here. It must be a satisfaction to him, as well as to astronomers all the world over, that he was able to accomplish another excellent piece of work before the close of his official career, during which he has done so much to enhance the fair fame of British astronomy.

A. M. W. D.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

Birmingham.—Dr. John Cadman, one of H.M. inspectors of mines, has been appointed to the chair of mining rendered vacant by the resignation of Prof. R. A. S. Redmayne.

Glasgow.—The University Court has established a lectureship in bacteriology, and appointed Dr. C. H. Browning as the first lecturer. The Court has also established a lectureship in geography, to which an appointment will be made in October.

The annual meeting of the Midland Agricultural and Dairy College will be held on Monday, July 27, at 3.15 p.m., when the report on the year's work will be presented. The Duke of Portland will address the meeting and present the certificates gained during last session.

To secure the best results, it is highly important that technical colleges should work in close connection with the needs of local industries. A distinguishing characteristic of the prospectus of the day classes at the Heriot-Watt College, Edinburgh, is the excellent system of coordinating the more theoretical work of the college with the practical experience gained during apprenticeship. Arrangements have been made with several of the leading firms of engineers in Edinburgh by which students of the college are allowed to begin their apprenticeship at the end of the second winter college session, returning to college the following winter to complete their third winter session. Students holding the college diploma have their term of apprenticeship reduced by a year, and in some cases either reduced premiums are charged to college students or the premiums are entirely dispensed with. The Edinburgh and Leith Corporations' gas commissioners, also, have agreed to allow students who have been three years in the chemistry department of the college to spend four summer months in the laboratories of their gas works, and thus to obtain a thorough knowledge of the analysis of fuels, products of combustion, coal gas, and coal distillation products. A two years' course of instruction in mining, again, has been arranged, which is accepted by the Home Office as equivalent to the two years' underground training required of those who wish to obtain the mine manager's certificate. In connection with the department of technical mycology, an arrangement has been made between the college and the Brewers' Association of Scotland by which brewers' apprentices who have completed satisfactorily an approved course will receive a joint certificate awarded by the association and the college. Students who already hold a university science degree can obtain special post-graduate instruction in several departments of technology. These instances are typical of the successful efforts which are being made in Edinburgh to make technical instruction of real benefit to those employed in industrial pursuits.

On the occasion of the visit of the King and Queen on July 9 to open the Royal Edward Dock at Avonmouth, an address was presented to their Majesties by the council and senate of the Bristol University College. After detailing the efforts which have been made to provide Bristol with a complete system of education, the address proceeds:—"We humbly trust that your Majesty will regard with satisfaction the provision that has thus been made in our city for education in its various grades, and will look with favour on our hope that our educational system will be completed and crowned by the establishment of a University in Bristol similar to those founded in recent years in other important cities of the realm. The public spirit and generosity lately shown by a member of a well-known Bristol family in promising the sum of one hundred thousand pounds towards the endowment of a Bristol University leads us to anticipate that with the help of other liberal benefactors our city may shortly be in a position to crave of your Majesty the grant of a Royal Charter for the incorporation of this University." During the course of his reply, the King said:—"It is now recognised by the great municipalities and other education authorities of my kingdom that it is their duty to provide facilities for the acquirement of special knowledge, so that young men may be enabled to obtain efficient equipment, both literary and technical, without travelling to distant Universities to obtain it. The generous emulation of rival cities in this respect is necessarily beneficial, for every addition to the practical efficiency and culture of a community, and every stimulus thereby supplied to others, are gains to the whole nation. I will take care that your petition for a grant of a charter for the incorporation of a University in Bristol is referred to a committee of my Privy Council, who will give it careful and sympathetic consideration, and then submit to me their advice." The Society of Merchant Venturers also presented an address in which reference was made to the willingness of the society to maintain a faculty of engineering in the University.

The Department of Agriculture and Technical Instruction for Ireland has for some years been very active in encouraging the teaching of science both in Irish secondary schools and technical institutes. Technical instruction also, through the efforts of the department, is being given successfully in numerous centres throughout Ireland. Illustrated accounts of the technical work in different districts are published in the Journal of the department from time to time, and afterwards re-published for wide distribution; the latest pamphlet to be issued in this way is a well illustrated description of the facilities for technical instruction in Queenstown, by Mr. George Thompson, the principal of the technical school in that town. The department also does very useful work in providing science teachers in Irish secondary schools with careful guidance as to the best methods of teaching and the most suitable courses of work in science for boys and girls in secondary schools. We have received copies of the revised syllabuses in physics and in physiology and hygiene. The syllabuses, in addition to a general introduction describing the aim and object of the instruction, outline experimental courses of study for each of the four years during which science is taught in the secondary school. During the first two years of their study of science the pupils investigate practically the simple fundamental principles of physics and chemistry, while during the third and fourth years some specialisation is allowed, and the study becomes more intensive. The syllabuses are well worth the careful atten-

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